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ern College for Women, Oxford, \$100,000 toward an endowment fund of \$500,000; Milwaukee-Downer College for Women, Milwaukee, Wisconsin, \$100,000 toward an endowment fund of \$500,000. Including the foregoing, the General Education Board has since its organization thirteen years ago appropriated to colleges \$12,322,460 toward a total sum of \$57,375,525 to be raised.

THE board of trustees of the Carnegie Institute, Pittsburgh, announce the gift of \$250,000 from the Carnegie corporation of New York, the money to be used for the purchase of ground north of the present campus.

THE formal opening of Alden Hall of Biology of Allegheny College took place on February 4. Dr. W. J. Holland, director of the Carnegie Museum of Pittsburgh, gave the principal address on "Biology, a Cultural and Practical Study." The building is 60 feet by 120 feet, built of gray vitrified brick and terra cotta, with a Spanish tile roof, and is well equipped throughout. Professor C. A. Darling is in charge of the department.

It is stated in *Nature* that the number of undergraduates in residence at Cambridge this term is 665, as against 1,227 during the corresponding term last year, and about 3,600 in a normal term. Amongst the 11,000 members of the university in the land, sea and air services, 1,723 casualties have been notified; 697 have been killed and 892 wounded.

THE Berlin correspondent of the *Journal* of the American Medical Association writes that during the semester preceding the opening of the war, 79,077 students (of whom 4,500 were women and about 9,000 foreigners) attended the fifty-two universities and other higher institutions of the German Empire. Of this number 60,943 (4,117 women, 4,100 foreigners) were enrolled in the twenty-one universities; 12,232 (82 women, 2,500 foreigners) were enrolled in the eleven technical schools. The six schools of commerce (Berlin, Cologne, Frankfurt, Leipzig, Mannheim and Munich) had 2,625 students, and the four veterinary colleges (Berlin, Dresden, Hanover and Munich) had 1,404 students. The three agricultural

colleges had 938 students. Three schools of mining had 668 students, and 267 students were registered in the four schools of forestry. During the first semester following the beginning of the war, the total number of matriculants fell to 64,700 in forty-seven of these institutions. The four schools of forestry were closed, and the veterinary school in Munich became a part of the university. During the winter of 1914-15, about 50,000 of these students were in the field or available for service; that is, 75.75 per cent. of the 66,000 German male students registered at the beginning of the war. Of the 66,000 German male students who were registered at the end of the summer of 1915, only 12,000 are still in attendance at the schools so that about 54,000, or 81.81 per cent., of German higher students are now enrolled in the army. Of the 13,785 university students registered during the summer semester of 1870, only 4,400 (32 per cent.) were at the front, and 3,200 of this number fell in the field.

DR. HOWARD E. PULLING has been appointed to an instructorship in plant physiology in the Johns Hopkins University for the current year.

DR. ROBERT LEWIS, assistant biochemist at the United States Pellagra Hospital, Spartanburg, S. C., has been elected professor of physiology in the University of Colorado.

## DISCUSSION AND CORRESPONDENCE

### ATMOSPHERIC TRANSMISSION

TO THE EDITOR OF SCIENCE: In SCIENCE for December 3, 1915, page 802, line 27, Mr. Very speaks as positively as ever of the diurnal variability of the transmission of the atmosphere and the incorrectness of neglecting its effect in reducing solar constant observations. Does the evidence to the contrary of the observations of September 20 and September 21, 1914, when the sun was observed at Mount Wilson from sun-rise to 10 o'clock, weigh nothing at all with him?<sup>1</sup>

Secondly. In his recent paper on "Earth-

<sup>1</sup> See "New Evidence on the Intensity of Solar Radiation Outside the Atmosphere," by Abbot, Fowle and Aldrich, Smithsonian Miscellaneous Collections, Volume 65, No. 4, 1915.

shine”<sup>2</sup> Mr. Very hangs the merit of his work on the exceptional clearness of August 8 and 9, 1912. It is very singular that these exceptionally clear days occurred when the effects of the dust cloud from Katmai volcano were at their maximum. At various high altitude stations the direct sunlight at high sun was reported to be reduced in August from 10 to 20 per cent., and skylight near the sun in daytime notably increased, yet it is at this very time that the moonlight scattered by the sky near the moon was so exceptionally small at Flagstaff.<sup>3</sup>

Thirdly. Mr. Very, in his paper submitted at Berkeley,<sup>4</sup> argues a high transparency of the atmosphere for the escape of terrestrial radiation, as opposed to the conclusion of Mr. A. Ångström. Very states “that practically all the terrestrial radiation which the atmosphere is capable of absorbing disappears in the first few meters of air traversed by the rays” and hence “the observed nocturnal radiation is a radiation to space,” contrary to the opinion of Mr. A. Ångström that only a fraction of it is a radiation to space.

The phenomenon is as follows: A blackened surface at 20° C. is found to give off radiation at a rate of from 0.12 to 0.20 calories per square centimeter per minute when exposed to cloudless night sky. Such a surface would radiate about 0.55 calories if exposed to an enclosure at absolute zero. The question is: Does the nocturnal radiation observed (0.12 to 0.20 calories) represent radiation transmitted almost wholly to space, or is it in a large de-

gree representing merely the radiation of the surface outward minus the radiation of the atmosphere inward? Mr. Very claims that for wave-lengths at which the atmosphere can absorb the rays, its full absorptive effect is produced within a few meters of the radiating surface. Here the temperature is not materially different from that of the surface, and re-radiation of the atmosphere in these wave-lengths approximates that of the black surface according to his view. Mr. Ångström, on the other hand, believes that many of the absorbable rays penetrate far into the atmosphere, where the temperature becomes much reduced, and hence the re-radiation is less than the outgoing radiation because it comes from a source at lower average temperature.

The point at issue is solved if it can be shown that increased length of path, or increased atmospheric humidity, do or do not affect nocturnal radiation. For the evidence see Table IX., p. 63, of A. Ångström's paper, “A Study of the Radiation of the Atmosphere,” Smithsonian Miscellaneous Collections, Vol. 65, No. 3. Experiments were made at two stations on the radiation to small parts of the sky at different zenith distances. I refer particularly to observations at Bassour, Algeria, although Mt. Whitney observations support the following conclusions too. Length of path in the atmosphere is shown to be of decided effect. The change from air mass 1 to air mass 3 reduced nocturnal radiation on August 20, 1912, by more than 70 per cent. The result also depends on the degree of humidity prevailing, as is shown plainly by inspection of the whole table. These results show that the whole vertical thickness of the atmosphere is insufficient to absorb “practically all the terrestrial radiation which the atmosphere is capable of absorbing.”

C. G. ABBOT

#### UNIVERSITIES AND UNPREPAREDNESS

TO THE EDITOR OF SCIENCE: Some weeks ago an open letter from Professor Stewart Paton appeared in SCIENCE. It was entitled, “Universities and Unpreparedness.” It suggested that universities could play an important part

<sup>2</sup> See *Astronomische Nachrichten*, Nos. 4,819–20, 1915.

<sup>3</sup> See in this connection Kimball, “The Effect Upon Atmospheric Transparency of the Eruption of Katmai Volcano,” *Monthly Weather Review*, 1913, 41: 153–159, also, “Volcanoes and Climate,” by Abbot and Fowle, Smithsonian Miscellaneous Collections, Volume 60, No. 29, 1913; also Kimball, *Monthly Weather Review*, September, 1915, p. 442, in which he shows for Santa Fé, New Mexico, elevation 7,000 feet, that as late as the last half of October, 1912, the mean solar radiation was only 1.37 calories at  $z=48^\circ$ , whereas he obtained 1.53 calories as the mean for the corresponding period of 1914.

<sup>4</sup> See *Pop. Ast.*, Vol. 23, p. 648.